Carbon dioxide, mostly from the burning of coal, gasoline and other fossil fuels, traps heat that otherwise would radiate into space. Global temperatures increased by about 1 degree Fahrenheit (0.6 degrees Celsius) during the 20th century, and international panels of scientists sponsored by world governments have concluded that most of the warming probably was traced to greenhouse gases.

The climatologists forecast continued temperature increases that will disrupt the climate, cause seas to rise and lead to other unpredictable consequences — unpredictable in part because of uncertainties in computer modeling of future climate.

Before the industrial age and extensive use of fossil fuels, the concentration of carbon dioxide in the atmosphere stood at 280 parts per million, scientists have determined.

Average readings at the 11,141-foot Mauna Loa Observatory, where carbon dioxide density peaks each northern winter, hovered around 379 parts per million on Friday, compared with about 376 a year ago.

That year-to-year increase of about 3 parts per million is considerably higher than the average annual increase of 1.8 parts per million during the past decade, and markedly more accelerated than the 1-part-per-million annual increase recorded a half-century ago, when observations were first made here.

Asked to explain the stepped-up rate, climatologists were cautious, saying data needed to be further evaluated. But Asia immediately sprang to mind.

"China is taking off economically and burning a lot of fuel. India, too," said Pieter Tans, a prominent carbon-cycle expert at NOAA's Boulder lab.

Another leading climatologist, Ralph Keeling, whose father, Charles D. Keeling, developed methods for measuring carbon dioxide, noted that the rate "does fluctuate up and down a bit" and said it was too early to reach conclusions.

But he added: "People are worried about 'feedbacks.' We are moving into a warmer world."

He explained that warming itself releases carbon dioxide from the ocean and soil. By raising the gas level in the atmosphere, that in turn could increase warming in a "positive feedback," said Mr. Keeling of San Diego's Scripps Institution of Oceanography.

The Intergovernmental Panel on Climate Change projects that, if unchecked, atmospheric carbon dioxide concentrations by 2100 will range from 650 to 970 parts per million. As a result, the panel estimates, the average global temperature would probably rise by 1.4 to 5.8 degrees Celsius (2.7 and 10.4 degrees F) between 1990 and 2100.

The 1997 Kyoto Protocol would oblige ratifying countries to reduce carbon dioxide emissions according to set schedules to minimize potential global warming. The pact has not taken effect, however.

The United States, the world's biggest carbon dioxide emitter, signed the agreement but did not ratify it, and the Bush administration has since withdrawn U.S. support, calling instead for voluntary emission reductions by U.S. industry and more scientific research into climate change.